REMARKS

Claims 1-10 are pending in the present application.

Objections to the specification

The Examiner has objected to the Abstract of the Disclosure for failing to be in proper format. Attached hereto is new Abstract of the Disclosure, to be inserted into the specification as indicated above. The new Abstract in no way adds new matter to the specification.

Rejections under 35 U.S.C. §112, second paragraph

Claims 1-7 have been rejected under 35 U.S.C. §112, second paragraph as being unclear. More specifically, claim 1 is asserted to be vague with the recitation of "membrane type flow matrix." Claim 1 has been amended for clarification to recite "a polymeric membrane type flow matrix." Support for this amendment is found on page 4, line 9 of the specification. Page 4, lines 1-12, describe suitable membrane materials for use in the present invention. Among those described are polymer membranes. As the amendment to claim 1 clarifies the nature of the membrane, withdrawal of the rejection is respectfully requested.

Claim 1, f2c) has been rejected as lacking antecedent basis for "the flow." Claim 1, f2c) has been amended to provide

antecedent basis for all terms and to recite "the second lateral flow."

Claim 2 has been rejected as being unclear as to how the separated components are further immobilized in the flow matrix. Applicants traverse this rejection and withdrawal thereof is respectfully requested. Claim 2 recites that the separated components are immobilized on the flow matrix in their separated positions prior to detection. The specification on page 6, lines 1-4, teaches that methods for immobilizing components in separation technologies are well known in the art, with chemical crosslinking agents and denaturation being examples of immobilization techniques. The specification on page 11, lines 5-8, further exemplifies the use of glutaraldehyde as a chemical crosslinker. One skilled in the art would readily know suitable immobilization techniques based on the disclosure of the specification. As such, withdrawal of the rejection is respectfully requested.

Claim 7 has been objected to as being of improperly multiple dependency and as being confusing as to when the membrane is placed on a flat surface. Applicants respectfully note that the dependency of claim 7 was amended with the preliminary amendment of

August 4, 2000. As such, withdrawal of the objection is respectfully requested.

In addition, claim 7 has been amended to more clearly define the method steps by reciting that the polymeric membrane type flow matrix is "first placed on a flat surface." Withdrawal of the rejection is respectfully requested.

Rejections under 35 U.S.C. §102(b)

Claims Claims 1-4 and 8-10 have been rejected as being under 35 U.S.C. §102(b) as anticipated by Filipi et al. (U.S. Pat. No. 4,313,906). Filipi et al. is asserted to disclose a TLC plate having

a) a first surface, which has a composition for performing TLC in a first direction, and

b) a second surface, which has a composition for performing TLC in a second direction.

Applicants traverse this rejection and withdrawal thereof is respectfully requested. The present invention, as encompassed by claim 1, is drawn to:

a chromatographic assay method, comprising the steps of:

a) providing a polymeric membrane type flow matrix attached to a liquid-impervious backing, which flow matrix permits a capillary force assisted lateral flow therethrough, and at least a part of

which flow matrix contains ion-exchange function, wherein the flow matrix has a foam-like structure with pores in the range of 0.01-20μm;

b) treating the flow matrix to reduce or eliminate nonspecific adsorption properties of the flow matrix;

c) applying to the flow matrix a sample containing at least two components;

d) initiating a first lateral flow of aqueous fluid to transport the sample through the flow matrix and separate the components therein;

e) interrupting said lateral flow; and either

f1) detecting at least one of said separated components on the flow matrix in the position reached by the respective component when the flow was interrupted; or

f2a) initiating a second flow of aqueous fluid to transport the components in a direction substantially transverse to the direction of the first lateral flow;

f2b) interrupting said second lateral flow; and

f2c) detecting at least one of said separated components on the flow matrix in the position reached by the respective components when the second lateral flow was interrupted.

The Examiner has rejected the invention of claims 1-4 and 8-10 as being anticipated by Filipi. Filipi appears to disclose

conventional thin layer chromatography (TLC). The present invention is distinguished from the TLC of Filipi.

With TLC, such as that of Filipi, the beds used for separation are particle coatings bound together by a binder. The bed is not made of flow-through pores, as found with a membrane. With TLC, organic solvents are typically used to separate the components of the sample. With the present invention, on the other hand, a polymeric membrane type matrix is used that has a foam-like structure containing flow through pores and an aqueous fluid is used to separate the components. As recited in claim 1, the present invention requires the use of a membrane having pores in the range of 0.01-20μm in size. There is no disclosure or suggestion of this feature in Filipi. As such, the present invention is not anticipated by Filipi and withdrawal of the rejection is respectfully requested.

Claims 8-10 have been rejected under 35 U.S.C. §102(b) as being anticipated by Pristoupil. Pristoupil is asserted to teach the use of nitrocellulose membrane filters for chromatography and electrophoresis for the separation of proteins and nucleic acids. Applicants traverse this rejection and withdrawal thereof is respectfully requested.

Claim 8 is drawn to a chromatographic device comprising a membrane type flow matrix attached to a liquid-impervious backing, wherein the membrane permits capillary force assisted lateral fluid flow therethrough and is modified to support ion-exchange functions. As disclosed on page 114, 3rd line from the bottom, through page 115, line 5 of the reference, Pristoupil discloses only the separation of low molecular weight components from proteins. With the method of Pristoupil, the proteins are adsorbed to nitrocellulose and form spots that streak from the application sited towards the front. Following treatment of the nitrocellulose membrane with detergents the membranes, could be used for electrophoresis as the proteins migrate freely with the front. Thus, Pristoupil discloses only total adsorption and front flow migration when using nitrocellulose membranes for protein separation. Pristoupil is discussed on page 1, line 27, through page 2, line 10 of the specification, wherein it is noted that with Pristoupil there is no true "chromatography" of the components, but rather either absolute binding or no binding. As such, Pristoupil does not disclose a chromatographic assay and does not anticipate the present invention. Withdrawal of the rejection is respectfully requested.

Rejections under 35 U.S.C. §103

Claims 5-10 have been rejected under 35 U.S.C. §103 as being obvious over Filipi combined with Pristoupil. The Examiner asserts that it would be obvious to modify the nitrocellulose plates of Filipi as taught by Pristoupil for the detection of nucleic acids and proteins. Applicants traverse this rejection and withdrawal thereof is respectfully requested.

The Examiner asserts that, "it would have been obvious to modify the nitrocellulose plates of Filipi et al. as taught by Pristoupil for detection of proteins and nucleic acid...." However, Filipi does not teach "nitrocellulose plates." Filipi teaches TLC plates, which are coated with silica gel. Nitrocellulose is typically not used in TLC because the organic solvents used in TLC can alter or dissolve the structure of the nitrocellulose. This fact is clearly discussed on page 110, 4th line from the bottom through page 111, line 1 of Pristoupil. As such, Pristoupil, in fact, teaches away from looking to Filipi.

In addition, the present invention is not achieved or suggested even if the references are combined. Filipi discloses the separation of low molecular weight substances using TLC. However, as discussed above, Filipi, which is drawn to TLC, fails to teach chromatography using a polymeric membrane having flow through pores with a pore size of 0.01-20μm.

Pristoupil discloses that membranes impregnated with antigen and separate proteins. However, this fact is well-known and not claimed as part of the present invention. Pristoupil further discusses the general concept that proteins can be directly adsorbed to nitrocellulose membranes or that if detergents are present the proteins will migrate with the front. There is no disclosure in Pristoupil of membrane chromatography. As such, Pristoupil also fails to teach chromatography using a polymeric membrane having flow through pores with a pore size of 0.01-20μm and the present invention is not achieved when the references are combined. Nor is there any suggestion in Pristoupil that proteins can be separated based on their charge using membrane chromatography. Withdrawal of the rejection is therefore respectfully requested.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact MaryAnne Armstrong, Ph.D. (Reg. No. 40,069) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

A marked-up version of the Abstract of the Disclosure and amended claims showing all changes is attached hereto.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a two (2) month extension of time for filing a reply in connection with the present application, and the required fee of $400.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By _____
Gerald M. Murphy, Jr., #28,977
MaryAnne Armstrong #40,069
P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

GMM/MAA/csp/jms
1614-0238P

(Rev. 01/22/01)

MARKED-UP VERSION SHOWING CHANGES

IN THE ABSTRACT

The Abstract of the Disclosure has been deleted and replace with the Abstract attached hereto.

IN THE CLAIMS

Claims 1 and 7 have been amended as follows.

1. (Amended) A chromatographic assay method, comprising the steps of:

a) providing a **polymeric** membrane type flow matrix attached to a liquid-impervious backing, which flow matrix permits a capillary force assisted lateral flow therethrough, and at least a part of which flow matrix contains ion-exchange function**, wherein the flow matrix has a foam-like structure with pores in the range of 0.01-20μm**;

b) treating the flow matrix to reduce or eliminate ~~**unspecific**~~ **nonspecific** adsorption properties of the flow matrix;

c) applying to the flow matrix a sample containing at least two components;

d) initiating a first lateral flow of aqueous fluid to transport the sample through the flow matrix and separate the components therein;

e) interrupting said lateral flow; and [either]

f1) detecting at least one of said separated components on the flow matrix in the position reached by the respective component when the flow was interrupted; or

f2a) initiating a second flow of aqueous fluid to transport the components in a direction substantially transverse to the direction of the first lateral flow;

f2b) interrupting said second lateral flow; and

f2c) detecting at least one of said separated components on the flow matrix in the position reached by the respective components when the **second lateral** flow was interrupted.

7. (Amended) The method according to claim 1, wherein the **polymeric** membrane type flow matrix is **first** placed on a flat support surface with the backing contacting the surface.